BLACKBIRD FOR TRAINING

Machine Learning for Enhanced Oil Recovery (EOR) Strategies



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Introduction

The integration of machine learning ML into Enhanced Oil Recovery EOR strategies is revolutionizing petroleum engineering. By leveraging predictive models, real-time data analytics, and advanced optimization algorithms, companies can maximize oil extraction, reduce operational risks, and improve cost efficiency.
This course equips participants with the skills to design, implement, and evaluate ML-based EOR solutions, empowering them to transform traditional recovery methods into data-driven, high-performance operations.

Course Objectives

- Understand the fundamentals of Enhanced Oil Recovery and its methods.
- Apply machine learning techniques to optimize EOR processes.
- Analyze geological, petrophysical, and production data effectively.
- Build predictive models for reservoir performance forecasting.
- Integrate real-time sensor data for adaptive recovery strategies.
- Assess the economic impact of ML-enhanced EOR projects.
- Implement automation in monitoring and decision-making.
- Identify and mitigate operational risks using data-driven insights.

Course Outlines

Day 1: Fundamentals of EOR and Machine Learning Applications

- Overview of primary, secondary, and tertiary oil recovery.
- Role of EOR in maximizing petroleum production.
- Introduction to machine learning in the oil and gas sector.
- Data types and sources in EOR operations.
- Challenges of traditional EOR methods.
- Case study: Comparing conventional vs. ML-driven EOR.



Day 2: Data Acquisition, Cleaning, and Feature Engineering

- Gathering geological, reservoir, and production data.
- Data preprocessing and handling missing values.
- Feature selection for reservoir modeling.
- Merging multiple datasets for model training.
- Sensor integration and IoT applications in EOR.
- Practical exercise: Creating a clean dataset for ML modeling.

Day 3: Predictive Modeling for Reservoir Performance

- Introduction to supervised and unsupervised learning for EOR.
- Building regression and classification models.
- Time-series forecasting for production rates.
- Early detection of well performance issues.
- Evaluating model accuracy and reliability.
- Practical exercise: Training a predictive model for oil recovery.

Day 4: Optimization and Automation of EOR Operations

- Applying optimization algorithms to maximize recovery.
- Automated decision-making using reinforcement learning.
- Real-time adaptive control of injection rates.
- Integration of predictive analytics into field operations.
- Risk mitigation through predictive maintenance.
- Practical exercise: Developing an ML-driven optimization plan.

Day 5: Project Evaluation and Continuous Improvement

- KPIs for EOR project success.
- Economic feasibility studies for ML-based EOR projects.
- Updating models with new operational data.
- Lessons learned from successful implementations.
- Building a roadmap for future EOR optimization.
- Practical exercise: Presenting a complete ML-based EOR project plan.



Why Attend this Course: Wins & Losses!

- Gain expertise in applying ML to petroleum engineering.
- Optimize recovery rates and extend field life.
- Reduce operational costs through automation.
- Improve prediction accuracy for reservoir behavior.
- Enhance decision-making with real-time analytics.
- Learn from real-world case studies and hands-on exercises.
- Develop strategies for sustainable production.
- Stay ahead with the latest AI and ML advancements in oil recovery.

Conclusion

Machine learning is redefining the boundaries of Enhanced Oil Recovery by enabling smarter, faster, and more accurate decision-making.

This course offers the tools, techniques, and practical knowledge needed to implement ML-driven EOR strategies that can significantly boost efficiency, reduce costs, and ensure long-term production sustainability.

